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Response to Official Action dated 19 April 2005

REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Official Action dated 19 April 2005. Responsive to the rejections made in the Official Action, Claims 1, 4, 5, 13, 14, 15 and 24 have been amended to clarify the combination of elements that form the invention of the subject Patent Application. Additionally, Claims 7 and 8 have been amended to change the dependency thereof and Claims 2, 16 – 23, 25 and 29 – 30 are cancelled.

In the Official Action, the Examiner indicated that Claims 5 – 6 and 13 – 15 were objected to as being dependent upon rejected base claims, but would be allowable if rewritten in independent form to include all of the limitations of the respective base claim and any intervening claims. Accordingly, Claim 5 has been amended to incorporate the subject matter of Claim 1 therein, thereby rewriting the claim in independent form, to include all of the limitations of the base claim, Claim 1, and any intervening claims, which there were none. Claims 13, 14 and 15 have each been respectively amended to incorporate the subject matter of Claim 9 therein, thereby placing those claims in independent form to include all of the limitations of the base claim, Claim 9, and any intervening claims, which there were none. Thus, Claims 5, 6, 13, 14, and 15 should now be allowable.

In the Official Action, the Examiner rejected Claims 1 – 4 and 7 – 8 under 35 U.S.C. § 103(a), as being unpatentable over Lee et al., U.S. Patent No. 5,617,149 in view of Hirzalla et al., U.S. Patent No. 6,415,000. The Examiner

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states that the Lee et al. reference discloses a method of detecting a scene change in a digital video sequence having a plurality of frames that includes calculating a first mean absolute difference value for the first frame relative to the second frame and determining if the first mean absolute difference value meets a second criterion. The Examiner stated that the reference also discloses designating the second frame as a scene change frame at least partially in response to determining the first mean absolute difference value meets the second criterion. The Examiner admits that the reference does not specifically disclose calculating a first root means squared (RMS) value for a first frame to a second frame, and the second frame to a third frame, determining if the first RMS value meets a first criterion, and designating the second frame as a scene change frame at least partially in response to determining the first RMS value meets the first criterion. However, the Examiner then refers to the Hirzalla et al. reference as disclosing a method of processing a video stream which comprises calculating a difference value between the first and second frames of the pair, determining if the difference value meets a first criterion, and designating the frame as a scene change frame at least partially in response to determining the difference value meets the first criterion. The Examiner further states that the reference discloses that the difference value can be calculated taking the root mean square of the differences in pixel values. The Examiner then concludes that it would have been obvious to a person of ordinary

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skill in the art to employ the method of detecting a scene change taught by Lee to incorporate the concepts disclosed by Hirzalla et al.

Before discussing the references relied upon by the Examiner, it is believed beneficial to first briefly review the method of the invention of the subject patent Application, as now claimed. The invention of the subject Patent Application is directed to a method for detecting a scene change in a digital video sequence having a plurality of frames. The method includes the step of calculating a first color weighted root means squared (RMS) value for a first frame relative to a second frame and the second frame relative to a third frame. The method also includes the step of calculating a first mean absolute difference (MAD) value for the first frame relative to the second frame. The method includes the step of determining if the first RMS value meets a first criterion and determining if the first MAD value meets a second criterion. The method further includes the step of designating the second frame as a scene change frame at least partially in response to determining that both the first RMS value meets the first criterion and the first MAD value meets the second criterion. Further, as now defined in Claim 4, the first color weighted RMS value is based at least in part on pixel luminance values and chromaticity-blue and chromaticity- red component values for the first and second frames.

In contradistinction, the Lee et al. reference is directed to an apparatus and method for detecting scene changes using the difference of MAD between image

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frames. As shown in Fig. 3, the reference provides a first comparison means for comparing absolute difference from the second absolute difference calculation means with a second threshold value for judging a scene change, and provides a second comparison means for comparing only the MAD of a corresponding frame from the multiplication means with a first threshold value for judging scene change. The system provides the output of each of the comparison means to a selection means for selecting **either** the results of the first comparison means or the second comparison means.

Thus, not only does the reference neither disclose nor suggest the determination of a scene change being based on determining that both the first RMS value meets the first criterion and the first MAD value meets the second criterion, but teaches that a scene change determination be made on one criteria comparison with a second threshold value or a second criteria comparison with a first threshold value. Thus, the reference clearly teaches away from utilizing the combination of multiple criteria providing coinciding indications of a scene change (a scene change being determined by multiple parameters each meeting a respective threshold).

The Hirzalla et al. reference does not overcome the deficiencies of Lee et al. Firstly, neither the Lee et al. reference nor Hirzalla et al. provide motivation for the combination suggested by the Examiner. The Lee et al. reference detects a scene change utilizing differences in mean absolute difference and nowhere

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discloses or suggests utilizing other criteria, let alone a combination of both the MAD value and RMS value. Further, as discussed above, Lee et al. uses only one criteria selected from a pair of criteria for determining a scene change. The Hirazella et al. reference is directed to a method of processing a video stream wherein scene changes are detected by comparing a root means square of the differences in pixel values with a threshold and nowhere discloses or suggests combining that determination with whether a MAD value meets a second criterion and then determining that both the first RMS value meets the first criterion and the first MAD value meets the second criterion to designate a frame as a scene change frame. Nowhere does the reference disclose or suggest determining a scene change using more than one criteria, it just uses a different criteria than Lee et al. Therefore, it can only be through the impermissible use of "hindsight" that the Examiner suggests the combination, utilizing Applicant's own disclosure as a "blueprint" for such combination.

Arguendo, even if Hirzalla et al. is properly combinable with Lee et al., such still does not make obvious the invention of the subject Patent Application. First, based on the teachings of Lee et al., one would combine the use of an RMS comparison with a threshold as one of the alternatives being input to the selector of Lee et al. Therefore, rather than considering both the first RMS value meeting the first criterion and the first MAD value meeting the second criterion, to

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determine a scene change frame, the decision based on the combination of references would be based one the RMS comparison or the MAD comparison.

Still further, Claim 1 has been amended to incorporate the subject matter of Claim 2 therein, wherein the first root means squared value is a color weighted root means square value. Whereas, Hirzalla et al. discloses that the RMS value is based on differences in "intensity value" (luminance) of each corresponding pair of pixels, column 1, lines 65 – column 2, line 3. While the reference does suggest that rather than intensity, hue can be used for the value, column 2, lines 3 – 5, the reference nowhere discloses or suggests a color weighted RMS value which combines both pixel luminance values and chrominance values, and specifically, chromaticity-blue and chromaticity-red component values, as now defined in Claim 4.

Thus, it is now believed that the methods of Lee et al. and Hirzalla et al. are not properly combinable. However, even if they were properly combinable, the combination thereof still fails to make obvious the invention of the subject Patent Application, as now claimed.

In the Official Action, the Examiner rejected Claims 9 – 12 under 35 U.S.C. § 103, as being unpatentable over Hirzalla et al. The Examiner states the reference discloses the detection of a scene change by calculating a difference value between the first and second frames of the pair and based at least partially on the difference value, determining that the frame is a scene change. The

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Examiner admits that the reference does not disclose calculating a second temporal derivative RMS value for a first frame relative to a second frame, and the second frame relative to the third frame, and based on at least partially on the second derivative value, determining the second frame is a scene change frame. However, the Examiner took official notice that it is conventionally/mathematically well known to calculate a second derivative of a value. The Examiner then concludes that it would have been obvious to a person of ordinary skill in the art to employ detecting a scene change as taught by Hirzalla et al. and to incorporate taking a second temporal derivative of a first frame relative to a second frame and the second frame relative to a third frame.

It is respectfully submitted that the Hirzalla et al. reference utilizes the comparison between two pairs of frames, a first pair of frames having a relatively short time difference therebetween and a comparison between two frames having a longer period than the first pair. Nowhere does the reference disclose or suggest comparing the RMS value of a first frame with a second frame and the second frame with a third frame, let alone the second temporal derivatives thereof. The fact that the calculation of a second derivative is known, mathematically, does not make obvious its use in the application of the invention of the subject Patent Application. The Examiner has not set forth any examples where a second temporal derivative of a value is utilized for evaluating changes in a video frame

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which would indicate the likelihood that such would represent a change which could be interpreted as a scene change.

As the rejection is based, at least in part, on facts within the personal knowledge of the Examiner, Applicant hereby requests the Examiner set forth such knowledge in the form of an affidavit so that the Applicant would have the opportunity to provide contradictory or explanatory affidavits themselves or on their behalf by independent experts in accordance with 37 C.F.R. § 1.104(d)(2).

With respect to Claim 10, it appears that the Examiner is further combining Hirzalla et al. with Lee et al., and thus the remarks made with respect thereto should be applied to rejection of Claim 10. Specifically, neither Hirzalla et al. nor Lee et al. disclose or suggest combining the comparisons of MAD value with a one threshold and the RMS value with another threshold, as a basis for determining a scene change. And as discussed above, the Hirzalla et al. reference neither discloses nor suggests utilizing a second temporal derivative of the RMS value as a criterion for detecting scene change. It is respectfully submitted that the use of the second temporal derivative of the RMS value cannot be obvious to one of ordinary skill in the art based strictly on the fact that the second derivative is a known mathematical function. The first derivative and third derivatives are known functions as well, and the fact that the first through third derivatives are known functions provides no basis for concluding that any of them applied to the RMS value would better detect a scene change or any basis for choosing one over

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the other. However, it is Applicants who have determined that the use of the second temporal derivative of the RMS value as an improved means for detecting a scene change, especially when combined with the mean absolute difference value meeting a particular criteria or being a local maximum, and such is non-obvious.

Claims 11 and 12 further define the combination of multiple criteria which when are coinciding, indicate a scene change. Thus, rather than considering one indicator or another, the invention of the subject Patent Application requires correspondence between multiple scene change indicators, which is neither disclosed nor suggested by Hirazella et al.

Claims 24 – 28 were rejected under 35 U.S.C. § 103(a), as being unpatentable over Wang, U.S. Patent No. 6,118,817, in view of Lee et al.

The Examiner states that the Wang et al. reference discloses a method of determining which portions of a video sequence are to be intracoded, including calculating an RMS value for a first portion of the video sequence and calculating a first absolute difference value for a first portion of the video sequence. The Examiner further states that the reference discloses determining if the first RMS value meets a first criterion and determining if the first absolute difference value meets a second criterion. Further, the Examiner states that the reference discloses determining if the absolute difference value meets a third criterion and causing an intracoding operation to be performed at least partially in response to at least two

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of the first-third criteria being met. The Examiner admits that the reference does not specifically disclose calculating a first mean absolute difference value for a first portion of the video sequence. However, the Examiner refers to the Lee et al. reference as disclosing a method for processing a video stream which includes calculating a first mean absolute difference value for a first portion of the video sequence and determining if the MAD value meets a second criterion and then designating a scene change at least partially in response to determining the first MAD value meets the second criterion. The Examiner then concludes that it would have been obvious to a person of ordinary skill in the art employing the method of Wang to incorporate the concepts of Lee et al. so as to calculate a first mean absolute difference value for the first portion of the video sequence and determine if the first MAD value meets the second criterion or the third.

It is respectfully submitted that the Wang reference is directed to a digital video signal encoder and encoding method having adjustable quantization. As shown in Fig. 1, the encoder includes an I/P framer 106 which is utilized to detect a scene change, column 13, lines 14 – 17. The function of the I/P framer 106 is based on the logic shown in Fig. 6. As determined in block 602, every 6.5 seconds the logic requires an I-frame be encoded. Between the timed interval for I-frames, block 604 tests the video frame to detect whether a scene change has occurred, which would then require the encoding as an I-frame. The logic for block 604 is shown in Fig. 7. The logic for detecting a scene change is based on whether the

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absolute pixel difference (luminance) is greater than a predetermined threshold value. That threshold value is one of two values, depending upon whether the sequence is a high motion sequence or not. Thus, at best, scene changes are detected in the alternative, whether the absolute pixel difference is greater than a first threshold or a second threshold, column 14, lines 17-54.

Thus, the Wang reference neither discloses nor suggests any scheme for detecting scene changes wherein an intracoding operation is performed at least partially in response to at least two of the first, second and third criteria being met, and nowhere discloses or suggests utilizing the first RMS value meeting a first criterion, or the first MAD value being a local maximum, as now claimed.

It is respectfully submitted that the Lee et al. reference is not properly combinable with Wang. Nowhere does the Lee et al. reference nor the Wang reference disclose or suggest how one would add the comparison of the MAD value of Lee et al. to the decision logic of Wang. Nowhere does either reference disclose or suggest any combination of criteria wherein the coinciding of two out of three criteria for detecting a scene change is utilized to cause an intracoding operation. Thus, here again, it can only be through the improper use of "hindsight" that the Examiner could suggest the combination of Wang and Lee et al.

Arguendo, even if properly combinable, the Lee et al. reference does not overcome the deficiencies of Wang. While the Lee reference, as previously

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discussed, discloses utilizing a comparison of the MAD value to detect a scene change, it neither discloses nor suggests considering correspondence between two of three calculated values to identify a scene change and thereby be the basis for causing an intracoding operation. Further, neither Wang nor Lee et al. disclose or suggest determining if the MAD value is a local maximum, rather than simply comparing it with a threshold value. Determining whether a frame represents a local maximum MAD value, requires comparison with the immediately preceding frame and the immediately following frame, which is neither disclosed nor suggested by either of the references.

Therefore, as the combination of Wang and Lee et al. fails to disclose or suggest the combination of elements which form the invention of the subject Patent Application, they cannot make obvious that invention, as defined in Claims 24 and 26 – 28.

For all the foregoing reasons, it is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

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The Director of Patents and Trademarks is hereby authorized to charge
Deposit Account No. 18-2011 for the amount of \$200.00 to cover the filing fees
associated with two additional independent claims added by this Amendment.

Respectfully submitted,
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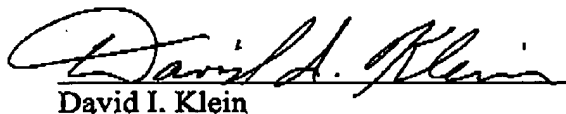
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